REMARKS

The claims have been rejected as being indefinite under 35 U.S.C. Section 112, as being anticipated under Section 102 by the admitted prior art, and as unpatentable over Foster et al. in view of Battu et al., under 35 U.S.C. 103. Reconsideration is respectfully solicited.

Rejection Under Section 102

The claims have been rejected as anticipated over the admitted prior art under Section 102. The Examiner's position seems to be three-fold: First, the Examiner asserts that the claims are inherently met by the admitted prior art of a 3½" disc drive because a "smaller" disc can be accommodated in less space than a "larger" disc. Second, the Examiner suggests that the numerical values included in claim 2 are duplicative of one another. Third, the Examiner asserts that the disc size is old.

The sole question under Section 102 is whether the claims recite a novel invention. The prior art Figures describe a 3½" disc drive having a standard 3½" external three-dimensional configuration, and containing discs having a standard diameter of 95 mm. Claims 1 and 3 require that the discs be smaller than the conventional disc, with the specific example of the 3½" drive set forth in dependent claims 2 and 4 being that the diameters of those discs are smaller than the standard 95 mm, with the specific size of 88 mm recited in claims 6, 9, 12, 14, 16 and 19. Additionally, claim 3 requires the number of discs within the disc drive housing is greater than the number of discs ordinarily contained in the standard configuration, with newly added dependent claims 8-12 and 15-20 being directed to the fact that six or twelve such discs are included, rather than five or ten of the standard configuration depending on whether the drive is a low-profile or half-high configuration.

While a smaller disc would (theoretically) fit in a larger space, the prior art has chosen not to do so. Indeed, with the direction toward more and more data to be stored on disc drives occupying a given space, the intuitive reasoning is to make the discs as large as possible. Applicant has done the opposite, namely has made the discs smaller.

Applicant does not understand the Examiner's suggestion that the numerical values are duplicative. The claims recite that the disc diameter is smaller than standard. To emphasize the point, claims 2 and 4 have been amended to recite that the disc diameter is smaller than the standard 95 mm, and further dependent claims recite that the disc diameter is 84 mm. These values are consistent, and not duplicative.

Finally, the Examiner asserts the disc size is old, but has offered no evidence of this assertion.

The subject matter of the claims is not found in the prior art. Consequently, the claims are not anticipated by the admitted prior art, which describes a disc drive with a larger disc and smaller stack of discs. Accordingly, the rejection on the basis of Section 102 should be withdrawn.

Rejection Under Section 103

The claims have been rejected as unpatentable under Section 103 over Foster et al. in view of Battu et al. Battu et al. is cited solely to show a magnetic disc drive having a plurality of rigid discs. Foster et al. teaches a convertor/cartridge that allows a 1½" floppy disc cartridge to be assembled into a 3½" floppy drive. More particularly, Foster's caddy 70 has a form factor corresponding to a standard 3½" floppy disc cartridge with various drive mechanisms to accommodate insertion and driving of the 1½" mini cartridge. When so inserted into the caddy, the 1½" mini cartridge can be employed a 3½" floppy disc drive.

Foster et al. is directed to a single floppy disc cartridge. Nevertheless, the Examiner asserts that it would be obvious to one of ordinary skill in the art to provide for a stack of discs in Foster.

Applicants' independent claims 1 and 3 require a stack of a plurality of rigid recording discs. A 3½" floppy disc drive, such as Foster's, accepts one (not a stack, not a plurality) of floppy, (not rigid) magnetic discs. A floppy disc is subject to undulations as the disc spins, requiring different head and support mechanisms not found in rigid drives. These special mechanisms make

floppy drives unsuitable for stacking a plurality of such discs into a single drive housing. As a result, commercially available stacked drives are rigid drives, not floppy drives, and are most often employed as the main memory of computers, such as servers. It is to stacked, rigid drives the present invention is directed. Applicant is at a loss as to how one would stack a plurality of floppy discs as suggested by the Examiner. Moreover, even if one were to somehow stack Foster's floppy discs, the result would be a stack of convertor/cartridges containing 1½" floppy discs, not a stack of rigid discs as claimed.

Floppy disc cartridge drives, as found in ordinary personal computers, serve a quite different function than the stack of rigid discs that ordinarily form the main memory of the computer. Each floppy disc cartridge contains a single disc and is insertable into, and removable from, the disc drive to allow easy transportation of the data from one computer to another, namely by simply transporting the cartridge. The purpose of the Foster et al. patent is to make the transportation even simpler where a 1½" mini cartridge floppy disc is involved. More particularly, the 1½" floppy cartridge may be inserted into Foster's convertor/cartridge and the entire assembly inserted into a 3½" floppy disc drive. Applicant, on the other hand, is concerned with the rigid disc drive, that typically forms the main memory of the personal computer. It is not transportable out of the computer as is a floppy disc cartridge but is rigidly mounted within the computer. It is a stack of discs, not one, as in a floppy disc cartridge.

It is respectfully submitted that it would not be evident to one of ordinary skill in the art how one would modify the teachings of Foster to somehow achieve a stack of rigid disc drives where Foster teaches no more than a caddy for carrying a single floppy disc drive.

Moreover, if the Examiner is asserting it would be obvious to employ a Foster convertor/cartridge caddy for each of Battu's rigid discs, Applicant is at a loss as to how the modification could take place. Replacement of Battu's discs with a stack of Foster's caddies would result in an inoperative device and destroy the features of both Battu's and Foster's devices.

Rejection Under Section 112

The substance of the Examiner's rejection under Section 112 is two-fold: First, the claims are indefinite for failure to state a measurable yardstick against which "larger" and "smaller" can be compared. Second, claim 2 merely recites a standard disc and standard disc drive. Additionally, the Examiner requests Applicant specifically points out what limitations in the claims deals with the unobvious or meaningful advance over the prior art.

As to the second point, claim 2 (and claim 4), do not recite a standard 3½" disc; they recite that the disc is smaller than a standard disc size of 95 mm. Further dependent claims recite a disc diameter of 84 mm, which is smaller than 95 mm. A standard 3½" disc has a diameter of 95 mm (which is actually about 3.74 inches). See page 5, line 17 and comparative Table 1 at page 19.

As to the first point, namely the "larger" and "smaller" comparison, independent claims 1 and 3 both recite that the disc drive housing has an external three-dimensional configuration that matches a standard configuration and that the disc in the housing is smaller than the standard disc. A standard external configuration of a 3½" disc drive is known, and described in the specification. See page 5, line 12 to page 6, line 9 and page 7, lines 21-28 (describing the half-high standard) and page 8, line 18 to page 9, line 2 (describing the low-profile standard). A standard 3½" disc is described in the specification as 95 mm. Thus, in the context of the 3½" drive, the disc is smaller than 95 mm. This fact is emphasized in the dependent claims which are directed to the 3½ drive and state that the disc diameter is smaller than the standard 95 mm. Similarly, as to the number of discs being greater than a standard drive, the standard is known for half-high and low-profile drives. In the context of a 3½" drive, a standard half-high has ten discs and a standard low-profile has five discs; the claims state the number is greater than standard. These standard configurations are well-known in the art and have definite meaning to the artisan, as described in the specification. While independent claims 1 and 3 are not limited to a 3½" standard configuration, they are limited to standard configurations, again each of which is well-known in the art and with precisely-defined dimensions. There can, accordingly, be nothing indefinite about the disc drive housings external three-dimensional configuration matching a standard configuration.

Claim 1 and its dependent claims 2 and 5-12 further require a disc drive in the housing (the housing being definitely defined in the first clause of claim 1) and that the disc drive has a stack of rotatable rigid magnetic recording discs in which each of the magnetic recording discs has a diameter "smaller than the diameter of rigid discs ordinarily contained in a disc drive having the standard configuration", i.e., smaller than standard discs. Dependent claims 2 and 5-12 define the diameter of the discs that are in the disc drive of the invention as being smaller than the standard of 95 mm. Dependent claims 6, 9 and 12 recite the specific diameter of 84 mm.

As to claim 1, the issue is whether the "smaller" diameter than a standard configuration is a measurable yardstick. The yardstick is clearly stated as 95 mm in claims 2 and 5-12. The diameter of rigid discs that are ordinarily contained in standard disc drives is well-known. Thus, in the case of a 3½" standard disc drive, the diameter of the standard disc is 95 mm as described in the specification. Claim 1 states that discs within the scope of the present invention are "smaller" than standard discs. Since the size of standard discs are known (95 mm in the case of a standard 3½" drive), there is a measurable yardstick against which to measure the diameter of discs within the scope of the present invention. Similarly, the size of standard discs in other standard disc drives is well-known. Claim 1, when applied to other disc drive standards is quite definite by requiring the disc be smaller than discs associated with that standard. Applying claim 1 to a 3½" standard, one can measure whether a disc is "smaller" than the known standard of 95 mm.

Claim 3 is similar to claim 1 in regards to the disc diameter. Thus, Claim 3 recites means for stacking and rotating a plurality of rigid magnetic recording discs wherein each disc has a diameter "smaller than the diameter of rigid magnetic discs ordinarily contained in a disc drive housing having the standard configuration", i.e., smaller than a standard disc. For the reasons given above, claim 3 and its dependent claims 4 and 9-12 are quite definite and measurable as to the size of the standard disc and the yardstick against which the size of the disc required by the claims must be measured.

Additionally, claim 3 further requires that the number of discs in the housing of the present invention must be "greater" than the number of discs ordinarily contained in the disc drive

housing having the standard configuration. As described in the specification, a "low-profile" 3½" drive contains five discs. In the case of a low-profile 3½" drive of claim 3, the number of discs within the housing must be greater than five. As described in the specification, a "half-high" 3½" drive contains ten discs; so a half-high 3½" drive of claim 3 will have more than ten discs. Dependent claims 8-10 and 18-20 are directed to a low-profile 3½" drive and requires there be six magnetic discs, which is greater than the standard five; dependent claims 11-12 and 15-17 are directed to a half-high 3½" drive and requires there be twelve discs, which is greater than ten as in the standard. Again, the yardstick is specifically recited in dependent claims 8-12 and 15-20.

It is submitted, therefore, that the measurements of the diameter of the disc in a disc drive according to the present invention as being "smaller" than a standard and that the number of discs as being "greater" than a standard are measurements related to precise numbers, well-known to the artisan. It is, accordingly, submitted that the claims are definite within the meaning of the second paragraph of Section 112.

While the specification describes specific embodiments of half high and low profile 3½" drives, the principles of the present invention are equally applicable to other standard sizes, simply by resorting to known principles. Hence, when applied to other standards, the scope and applicability of the invention is fully predictable. *In re Fisher*, 166 USPQ 18 (CCPA 1970).

> In cases involving predictable factors, such as mechanical or electrical elements, a single embodiment provides a broad enablement in the sense that, once imagined, other embodiments can be made without difficulty and the performance characteristics predicted by resort to known scientific laws. 166 USPQ at 24.

Statement of Inventive Feature(s)

The Examiner requests that to be complete, the response should point out which limitation in the claims deals with an obvious or meaningful advance over the prior art. It is respectfully submitted that the patentability of each claim should be treated as a whole, not by any one of its individual parts. Consequently, it is unreasonable for the Examiner to demand that the

Applicant identify one or two limitations in the claims that describe patentable advances over the prior art. Instead, the claims must be construed as a whole.

Nevertheless, in the "spirit" of the Examiner's request, the concept of the present invention is directed to a rigid disc drive that contains a stack of rigid discs in which the housing for the disc drive is of a standard external three-dimensional configuration, yet the discs are smaller in diameter than the standard discs ordinarily associated with the standard configuration. An additional concept of the present invention recited in claim 3 and certain dependent claims, is that the number of discs in the stack is greater than in a drive having the standard configuration.

The advantages of the present invention are described in the specification. The smaller discs requires shorter overall stroke between the inner and outer tracks, resulting in smaller inertia for the actuator arm and quicker track seek times than over prior art drives. As described at page 18, lines 5-14, average seek times as low 5.7 milliseconds are achieved, about 2 milliseconds faster than prior art drives of the same standard, and the shorter actuator arms require less inertia. Likewise, non-repeatable run-out is improved by between 21% and 33%. See page 18, line 15-page 19, line 21. The disc drive of the present invention rotates the discs at a higher rotational speed (10,000 rpm, see page 11, line 2) than most prior drives (7,200 rpm, see page 6, line 6). While one would expect to increase heat in the disc drive (see page 2, line 22) due to increased speed, the smaller discs of the present disc drive actually generate less heat, resulting in the disc drive actually operating cooler than in the prior art. Overall, and as amplified in the section below on commercial success, the disc drive of the present invention is simply better than its predecessors.

The invention is characterized by smaller discs. As described in the specification, numerous factors were required to achieve the improved drive of the present invention. Nevertheless, the improved disc drive is characterized by the smaller discs. Among the factors leading to the improved disc drive are the altered flex connector assembly of Figures 12-15, the novel stop mechanism of Figures 11 and 12 including the method of establishing the inner and outer tracks for the discs as described in connection with Figure 14, the novel desiccant housing shown in Figures 5-8, the conformable cable connector illustrated in Figures 9 and 10, and the housing wall

requirements and the shim, spacers and clamp rings sizes, shown in Figure 4 and described at page 11, line 24-page 12, line 20.

Commercial Success

Applicant is prepared to demonstrate that the invention of the present application has enjoyed phenomenal commercial success since introduction in late 1977 of the 9LP and 18HH versions of the Cheetah® rigid magnetic disc drive by Seagate Technology, Inc., the assignee of the present application. The invention is incorporated in the 9LP and 18HH models of the Cheetah rigid magnetic disc drive as well as in the 18LP and 36HH models of the Cheetah drive, introduced in 1999. These disc drives incorporate the invention in what is referred to by Seagate as a "reduced media diameter" technology. These models of the Cheetah drive are referred to as a "reduced media diameter" drive because they employ recording discs having a diameter of 84 mm., rather than a standard 95 mm. as found in standard 3½" disc drives. The Cheetah drive is commercially available in two versions, a low profile (LP) version that has six discs (as opposed to five in standard low profile 3½" disc drives), and a half-high (HH) version that has twelve discs (as opposed to ten in standard half-high 3½" disc drives)[1]. The dramatic commercial success of the Cheetah drives incorporating the features of the present invention, both as to the generation Cheetah drives comprising the 9LP and 18HH drives and the more recently introduced generation Cheetah drives known as the 18LP and 36HH drives is demonstrated by the Seagate press releases appended as Exhibits A through D:

> Exhibit A is a copy of the press release of September 28, 1998 announces that the Cheetah 9LP and 18HH rigid disc drives are used in the top ten computer servers, as rated by the TPC benchmark test;
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> Exhibit B is a copy of the press release of May 26, 1998 describing incorporation of the Cheetah 9LP disc drive into Hewlett-Packard's NetServer system;

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1. Earlier models of the Cheetah drive, namely the 4LP and 9HH, included less-than standard numbers of discs (4 and 8, rather than 5 and 10), but did not include the "reduced media diameter" technology first found in the later 9LP and 18HH Cheetah drives.

Exhibit C is a copy of the press release of March 15, 1999 announcing the shipment of the 2½ millionth Cheetah drive (although this figure include the less popular Cheetah 4LP and 9HH drives that do not include the reduced media diameter technology); and

Exhibit D is a copy of the press release of April 20, 1998 describing awards won by Seagate drives, including the Cheetah 9LP drive that incorporates the present invention.

The press release of March 15, 1999 (Exhibit C) makes particular note of the fact that the Cheetah 9LP and 18HH drives introduced the "reduced media diameter" technology to the industry, resulting in cooler operation and faster seeks (shorter seek times).

Appended as Exhibit E is a list of 46 industry awards granted to Seagate in connection with its Cheetah 9LP and 18HH disc drives.

Applicant is prepared to demonstrate that every major manufacturer of computer servers, including those having their own disc drive manufacturing capability, has incorporated the Cheetah 9LP, 18HH, 18LP or 36HH disc drive into computer servers marketed by them, even over their own disc drives. Moreover, Applicant is prepared to demonstrate that since Seagate introduced the Cheetah 9LP and 18HH disc drives in late 1997, at least three competitors have emulated Seagate's reduced media diameter technology and introduced disc drives with reduced media diameters.

Thus, commercial success of the invention can be demonstrated by (1) significantly great quantities of shipments of disc drives incorporating the features of the present invention, (2) drives incorporating the invention have received numerous industry awards, (3) drives incorporating the invention are favored by mainframe manufacturers for inclusion in computer mainframes over drives manufactured by those same mainframe manufacturers, and (4) since the introduction of the Cheetah reduced media diameter drives, competitors have emulated the technology and produced their own reduced media diameter drives. This commercial acceptance is a direct result of the unexpected cooler operation and shorter seek times resulting from the reduced diameter media technology. The superior performance of drives incorporating the reduced media diameter prompts major mainframe manufacturers who also manufacture drives to incorporate the Cheetah drive into

their mainframes, rather than their own drives. This same superior performance prompts competitors to emulate the reduced media diameter concepts into their own drives to compete with Seagate's Cheetah drives. These factors demonstrate the commercial success, as well as the novelty and non-obviousness of the invention.

Additional Information Disclosure Statement

Included is a Supplemental IDS citing product data sheets for the Cheetah 4LP and 9HH disc drive that operate at 10,000 rpm but does not incorporate the reduced media diameters of the present invention. These drives contain less-than-standard numbers of discs, namely 4 and 8, respectively.

Favorable reconsideration and early allowance of this application are respectfully solicited.

Respectfully submitted,
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